Complete Summary

GUIDELINE TITLE

Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship.

BIBLIOGRAPHIC SOURCE(S)

Dellit TH, Owens RC, McGowan JE Jr, Gerding DN, Weinstein RA, Burke JP, Huskins WC, Paterson DL, Fishman NO, Carpenter CF, Brennan PJ, Billeter M, Hooton TM, Infectious Diseases Society of America, Society for Healthcare Epidemiology of America. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clin Infect Dis 2007 Jan 15;44(2):159-77. [174 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

- Conditions and diseases requiring antimicrobial use
- Unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms, and the emergence of resistance

GUIDELINE CATEGORY

Management
Prevention

CLINICAL SPECIALTY

Infectious Diseases
Pharmacology
Preventive Medicine

INTENDED USERS

Health Care Providers
Hospitals
Pharmacists
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To provide evidence-based recommendations for developing a program to enhance antimicrobial stewardship in the hospital setting to improve the quality of care

Note: These guidelines focus on the development of effective hospital-based stewardship programs and do not include specific outpatient recommendations.

TARGET POPULATION

All patients in acute care hospitals

INTERVENTIONS AND PRACTICES CONSIDERED

Measures for Developing An Institutional Program to Enhance Antimicrobial Stewardship

1. Antimicrobial stewardship team and administrative support
2. Active antimicrobial stewardship strategies
    - Prospective audit with intervention and feedback
    - Formulary restriction and preauthorization
3. Supplemental antimicrobial stewardship strategies
    - Education
    - Guidelines and clinical pathways
    - Antimicrobial cycling and scheduled antimicrobial switch (*not recommended for routine use*)
    - Antimicrobial order forms
    - Combination therapy (*not recommended for routine use*)
    - Streamlining or de-escalation of therapy
    - Dose optimization
    - Parenteral to oral conversion
4. Computer surveillance and decision support
5. Microbiology laboratory role in antimicrobial stewardship

6. Monitoring of process and outcome measurements

MAJOR OUTCOMES CONSIDERED

- Clinical outcomes
- Antimicrobial use and resistance
- Length of hospital stay and health care costs
- Patient morbidity and mortality

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The recommendations in this guideline are based on a review of published studies identified through a search of the PubMed database (search terms used alone and in combination included "antimicrobial," "antibiotic," "stewardship," "management," "resistance," "cost," "education," "guidelines," "restriction," "cycling," "order forms," and "combination therapy") supplemented by review of references of relevant articles to identify additional reports. Committee members were also asked to cite additional relevant studies to support the recommendations.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

I. Evidence from at least one properly randomized, controlled trial
II. Evidence from at least one well-designed clinical trial without randomization, from cohort or case-control analytic studies (preferably from more than one center), from multiple time-series, or from dramatic results of uncontrolled experiments
III. Evidence from opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Recommendations reflect a compilation of the studies in each section, as well as the opinions of the committee members.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

A. Good evidence to support a recommendation for use
B. Moderate evidence to support a recommendation for use
C. Poor evidence to support are commendation for use

COST ANALYSIS

Published cost analyses were reviewed.

Effective antimicrobial stewardship programs can be financially self-supporting and improve patient care. Comprehensive programs have consistently demonstrated a decrease in antimicrobial use (22 to 36%), with annual savings of $200,000 to $900,000 in both larger academic hospitals and smaller community hospitals.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Each recommendation includes a ranking for the strength and the quality of evidence supporting it. Definitions of the levels of evidence (I-III) and grades of recommendation (A-C) are repeated at the end of the Major Recommendations field.

Guidelines for Developing An Institutional Program to Enhance Antimicrobial Stewardship

The Antimicrobial Stewardship Team and Administrative Support

- Core members of a multidisciplinary antimicrobial stewardship team include an infectious diseases physician and a clinical pharmacist with infectious diseases training (**A-II**) who should be compensated for their time (**A-III**), with the inclusion of a clinical microbiologist, an information system specialist, an infection control professional, and hospital epidemiologist being optimal (**A-III**). Because antimicrobial stewardship, an important component of patient safety, is considered to be a medical staff function, the program is usually directed by an infectious diseases physician or codirected by an infectious diseases physician and a clinical pharmacist with infectious diseases training (**A-III**).
- Collaboration between the antimicrobial stewardship team and the hospital infection control and pharmacy and therapeutics committees or their equivalents is essential (**A-III**).
- The support and collaboration of hospital administration, medical staff leadership, and local providers in the development and maintenance of antimicrobial stewardship programs is essential (**A-III**). It is desirable that antimicrobial stewardship programs function under the auspices of quality assurance and patient safety (**A-III**).
- The infectious diseases physician and the head of pharmacy, as appropriate, should negotiate with hospital administration to obtain adequate authority, compensation, and expected outcomes for the program (**A-III**).
- Hospital administrative support for the necessary infrastructure to measure antimicrobial use and to track use on an ongoing basis is essential (**A-III**).

Elements of an Antimicrobial Stewardship Program

Active Antimicrobial Stewardship Strategies

Prospective Audit with Intervention and Feedback

- Prospective audit of antimicrobial use with direct interaction and feedback to the prescriber, performed by either an infectious diseases physician or a clinical pharmacist with infectious diseases training, can result in reduced inappropriate use of antimicrobials (**A-I**).

Formulary Restriction and Preauthorization Requirements for Specific Agents

- Formulary restriction and preauthorization requirements can lead to immediate and significant reductions in antimicrobial use and cost (**A-II**) and may be beneficial as part of a multifaceted response to a nosocomial outbreak of infection (**B-II**). The use of preauthorization requirements as a means of controlling antimicrobial resistance is less clear, because a long-term beneficial impact on resistance has not been established, and in some circumstances, use may simply shift to an alternative agent with resulting increased resistance (**B-II**). In institutions that use preauthorization to limit the use of selected antimicrobials, monitoring overall trends in antimicrobial use is necessary to assess and respond to such shifts in use (**B-III**).

Supplemental Antimicrobial Stewardship Strategies

The following elements may be considered and prioritized as supplements to the core active antimicrobial stewardship strategies based on local practice patterns and resources.

Education

- Education is considered to be an essential element of any program designed to influence prescribing behavior and can provide a foundation of knowledge that will enhance and increase the acceptance of stewardship strategies (**A-III**). However, education alone, without incorporation of active intervention, is only marginally effective in changing antimicrobial prescribing practices and has not demonstrated a sustained impact (**B-II**).

Guidelines and Clinical Pathways

- Multidisciplinary development of evidence-based practice guidelines incorporating local microbiology and resistance patterns can improve antimicrobial utilization (**A-I**). Guideline implementation can be facilitated through provider education and feedback on antimicrobial use and patient outcomes (**A-III**).

Antimicrobial Cycling and Scheduled Antimicrobial Switch

- There are insufficient data to recommend the routine use of antimicrobial cycling as a means of preventing or reducing antimicrobial resistance over a prolonged period of time (**C-II**). Substituting one antimicrobial for another may transiently decrease selection pressure and reduce resistance to the restricted agent. Unless the resistance determinant has been eliminated from the bacterial population, however, reintroduction of the original antimicrobial is again likely to select for the expression of the resistance determinant in the exposed bacterial population.

Antimicrobial Order Forms

- Antimicrobial order forms can be an effective component of antimicrobial stewardship (**B-II**) and can facilitate implementation of practice guidelines.

Combination Therapy; Prevention of Resistance Versus Redundant Antimicrobial Coverage

- There are insufficient data to recommend the routine use of combination therapy to prevent the emergence of resistance (**C-II**). Combination therapy does have a role in certain clinical contexts, including use for empirical therapy for critically ill patients at risk of infection with multidrug-resistant pathogens, to increase the breadth of coverage and the likelihood of adequate initial therapy (**A-II**).

Streamlining or De-escalation of Therapy

- Streamlining or de-escalation of empirical antimicrobial therapy on the basis of culture results and elimination of redundant combination therapy can more effectively target the causative pathogen, resulting in decreased antimicrobial exposure and substantial cost savings (**A-II**).

Dose Optimization

- Optimization of antimicrobial dosing based on individual patient characteristics, causative organism, site of infection, and pharmacokinetic and pharmacodynamic characteristics of the drug is an important part of antimicrobial stewardship (**A-II**).

Parenteral to Oral Conversion

- A systematic plan for parenteral to oral conversion of antimicrobials with excellent bioavailability, when the patient's condition allows, can decrease the length of hospital stay and health care costs (**A-I**). Development of clinical criteria and guidelines allowing conversion to use of oral agents can facilitate implementation at the institutional level (**A-III**).

Computer Surveillance and Decision Support

- Health care information technology in the form of electronic medical records (**A-III**), computer physician order entry (**B-II**), and clinical decision support (**B-II**) can improve antimicrobial decisions through the incorporation of data on patient-specific microbiology cultures and susceptibilities, hepatic and renal function, drug-drug interactions, allergies, and cost. However, implementation of these features has been slow, and conformation of the technology to the clinical environment remains a challenge.
- Computer-based surveillance can facilitate good stewardship by more efficient targeting of antimicrobial interventions, tracking of antimicrobial resistance patterns, and identification of nosocomial infections and adverse drug events (**B-II**).

Microbiology Laboratory

- The clinical microbiology laboratory plays a critical role in antimicrobial stewardship by providing patient-specific culture and susceptibility data to optimize individual antimicrobial management and by assisting infection control efforts in the surveillance of resistant organisms and in the molecular epidemiologic investigation of outbreaks (**A-III**).

Monitoring of Process and Outcome Measurements

- Both process measures (did the intervention result in the desired change in antimicrobial use?) and outcome measures (did the process implemented reduce or prevent resistance or other unintended consequences of antimicrobial use?) are useful in determining the impact of antimicrobial stewardship on antimicrobial use and resistance patterns (**B-III**).

Definitions of Strength of Recommendation and Quality of Evidence Ratings:

Quality of Evidence

I. Evidence from at least one properly randomized, controlled trial
II. Evidence from at least one well-designed clinical trial without randomization, from cohort or case-control analytic studies (preferably from more than one center), from multiple time-series studies, or from dramatic results of uncontrolled experiments
III. Evidence from opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees

Strength of Recommendation

A. Good evidence to support a recommendation for use
B. Moderate evidence to support a recommendation for use
C. Poor evidence to support are commendation for use

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms, and the emergence of resistance.
- The combination of effective antimicrobial stewardship with a comprehensive infection control program has been shown to limit the emergence and transmission of antimicrobial-resistant bacteria. A secondary goal of antimicrobial stewardship is to reduce health care costs without adversely impacting quality of care.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

These guidelines are not a substitute for clinical judgment, and clinical discretion is required in the application of guidelines to individual patients.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Comprehensive Multidisciplinary Antimicrobial Management Programs

Through the previous review of individual interventions directed at improving antimicrobial use, it is clear that effective antimicrobial stewardship requires a multidisciplinary team approach that incorporates many of these elements simultaneously. The core members of a comprehensive antimicrobial management program include an infectious diseases physician and a clinical pharmacist with infectious diseases training, with the inclusion of infection control professionals, the hospital epidemiologist, a clinical microbiologist, and an information system specialist, when possible. The latter is critical for linking the patient's medical record to the pharmacy and microbiology databases, to identify interventions and to perform surveillance activities. Program personnel should be included as active members on the hospital infection control and pharmacy and therapeutics committees or their equivalents.

Central to an effective program is a proactive strategy incorporating prospective audit with direct intervention and feedback to the provider and/or preauthorization requirements for antimicrobial use. On the basis of an understanding of local antimicrobial use and resistance problems and of available resources that may differ depending on the size of the institution, the core active strategies may be supplemented by education, guidelines and clinical pathways, antimicrobial order forms, adequate empirical therapy followed by de-escalation based on culture results, dose optimization, and a systematic plan for conversion from parenteral to oral therapy. Consensus building with the support of administration and local providers is essential, with the focus on collaborating in the safety and care of their patients rather than a policing role. Although reports describing the clinical and economic impacts of multidisciplinary antimicrobial management programs are limited to single-center longitudinal studies, they consistently demonstrate a decrease in antimicrobial use (22% to 36%) and annual savings of $200,000 to $900,000, which more than pays for the program in both larger academic hospitals and smaller community hospitals. Quantifying a long-term impact on antimicrobial resistance has been more challenging, and further studies are needed to determine the optimal processes by which the goals of improved clinical outcomes and containment of antimicrobial resistance can be achieved. However, given the strong association between antimicrobial use and antimicrobial resistance, improving antimicrobial stewardship is an important first step.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Dellit TH, Owens RC, McGowan JE Jr, Gerding DN, Weinstein RA, Burke JP, Huskins WC, Paterson DL, Fishman NO, Carpenter CF, Brennan PJ, Billeter M, Hooton TM, Infectious Diseases Society of America, Society for Healthcare Epidemiology of America. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clin Infect Dis 2007 Jan 15;44(2):159-77. [174 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2007 Jan 15

GUIDELINE DEVELOPER(S)

Infectious Diseases Society of America - Medical Specialty Society
Society for Healthcare Epidemiology of America - Professional Association

SOURCE(S) OF FUNDING

Infectious Diseases Society of America (IDSA)

GUIDELINE COMMITTEE

Infectious Diseases Society of America (IDSA) Standards and Practice Guidelines Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

J.E.M. has received research support for Project ICARE from AstraZeneca, bioMerieux, Elan, Pfizer, and 3M Health Care and has served as a consultant for Cubist, Dade Microscan, Merck, Replidyne, and Wyeth. D.N.G. has patents licensed to ViroPharma; has received research grants from Genzyme, Massachusetts Biological Laboratories, and ViroPharma; and has served as consultant for AstraZeneca, Genzyme, Optimer, Romark, GOJO, Salix, and ViroPharma. W.C.H. has received research support from Elan and Merck and has served as consultant to Roche Diagnostics. D.L.P. has received research grants from AstraZeneca, Elan, Merck, and Pfizer and has served as a consultant or on speakers' bureaus for Merck, Cubist, Pfizer, Elan, and Genzyme. M.B. has served on speakers' bureaus for Merck and Pfizer. All other authors: no conflicts.

ENDORSER(S)

American Academy of Pediatrics - Medical Specialty Society
American Society of Health-System Pharmacists - Professional Association
Infectious Diseases Society of Obstetrics and Gynecology - Professional Association
Pediatric Infectious Diseases Society - Professional Association
Society for Hospital Medicine - Professional Association
Society of Infectious Diseases Pharmacists - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Infectious Diseases Society of America (IDSA) Web site.

Print copies: Available from Dr. Thomas M. Hooton, University of Miami Miller School of Medicine, Highland Professional Bldg., 1801 NW 9th Ave., Ste. 420 (M-716), Miami, FL 33136; Email: THooton@med.miami.edu.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Kish MA. Guide to development of practice guidelines. Clin Infect Dis 2001 Mar 15;32(6):851-4.

Electronic copies: Available from the Clinical Infectious Diseases Journal Web site.

Print copies: Available from Infectious Diseases Society of America, 1300 Wilson Boulevard, Suite 300, Arlington, VA 22209.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on April 19, 2007. The information was verified by the guideline developer on April 23, 2007.

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